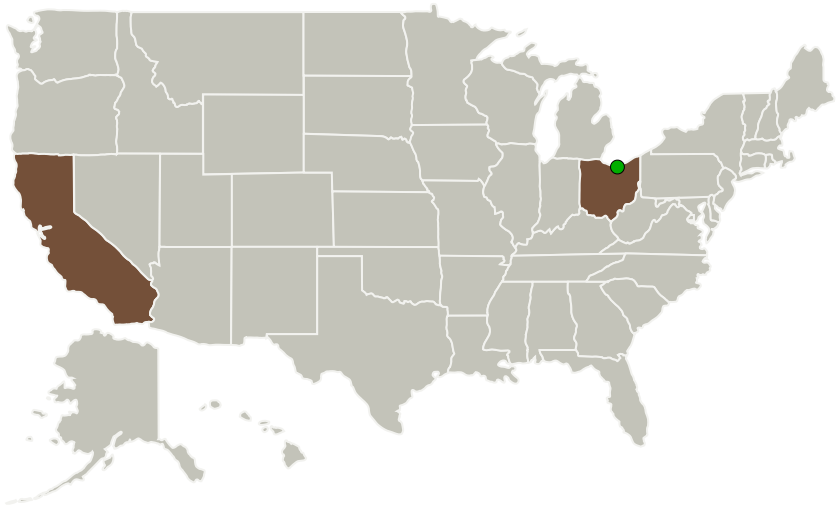
# Miniature Flexible Humidity Sensitive Patches for Space Suits, Phase I

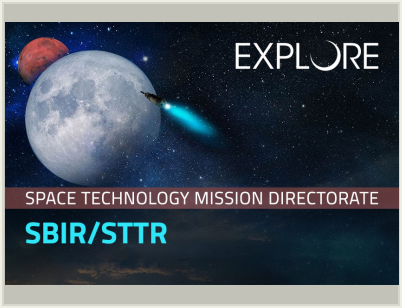
Completed Technology Project (2011 - 2011)

## Project Introduction

Advanced space suit technologies demand improved, simplified, long-life regenerative sensing technologies, including humidity sensors, that exceed the performance of current commercial devices. Intelligent Optical Systems proposes to develop luminescence-based optical sensors to monitor relative humidity (RH). The proposed sensors will offer flexible packaging designs and outstanding performance at high RH levels and under water saturation. Miniature flexible humidity-sensitive patches, connected to an optoelectronics reader by an optical fiber, will allow great flexibility in fitting the sensor element into the space suit. The sensor materials will consist of a luminescent indicator, whose emission lifetime depends on humidity, supported in chemically and mechanically passive polymer film. Since measurements that rely on emission lifetime are insensitive to indicator bleaching, and fluctuations in the light source and/or the photodetector, the measurements will be reliable and stable. The advantages of using optical sensors include easy miniaturization, immunity to electric and electromagnetic fields, and amenability to multiplexing. In Phase I, we will develop and analytically characterize humidity-sensitive materials, and prepare flexible sensor patches. In Phase II, we will manufacture prototypes for aeronautic qualification and conduct extensive testing under simulated environmental conditions. Sensitive patches to O2 and CO2 interrogated by the same electronic unit could be incorporated.

## Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Intelligent Optical Systems, Inc. | Lead Organization | Industry | Torrance, California |
| Glenn Research Center(GRC) | Supporting Organization | NASA Center | Cleveland, Ohio |

| Primary U.S. Work Locations | |
|---|---|
| California | Ohio |

## Project Transitions

**February 2011:** Project Start

**September 2011:** Closed out

**Closeout Summary:** Miniature Flexible Humidity Sensitive Patches for Space Suits, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image*(https://techport.nasa.gov/file/138306)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Intelligent Optical Systems, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Jesus D Alonso

**Co-Investigator:**

Jesus Delgado Alonso

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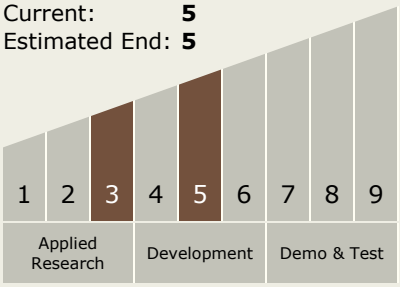
## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**




## Technology Areas

**Primary:**

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.2 Portable Life Support System

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System